PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P13102/OLL	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP 03/11589	International filing date *(day/month/year)* 20.10.2003	Priority date *(day/month/year)* 22.10.2002
International Patent Classification (IPC) or both national classification and IPC H01Q1/24		
Applicant SONY ERICSSON MOBILE COMMUNICATIONS AB ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10.05.2004	06.09.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Moumen, A Telephone No. +31 70 340-4411

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/11589

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-9 as originally filed

Claims, Numbers

1-11 received on 03.07.2004 with letter of 01.07.2004

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☒ the claims, Nos.: 12-15

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: US 2002/070902 A1 (JOHNSON GREG ET AL) 13 June 2002 (2002-06-13)

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

a multiband radio antenna device (Fig. 5, 10) for a radio communication terminal comprising a flat ground substrate (22), and in a plane parallel to said ground substrate a flat parasitic element (18) having a ground connection (40), and a flat antenna element (16,66) having a feeding point (12) and a ground connection (16,46) wherein said antenna element has a first longitudinal member (first part of L-shaped element 66), a first transverse member (second part of L-shaped element 66) extending from a first end portion of said first longitudinal member and a second transverse member (16) extending from said first longitudinal member in the same direction as said first transverse member, wherein said parasitic element (18) extends parallel to said second transverse member (16) and a first ground connection (46) of the antenna element is disposed at an end portion, opposite said longitudinal member, of the second transverse member (16).

The subject-matter of claim 1 differs from this known multiband radio antenna in that:

(a) said second transverse member extends from a centre portion of said first longitudinal member,

(b) said parasitic element extends between said first and second transverse members, along and adjacent to an outer portion of said second transverse member from a centre portion of the second transverse member,

© said feeding point is disposed at said centre portion of the second transverse member,

(d) and a second ground connection of the antenna element is disposed at a centre portion of said first transverse member.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to provide a compact built-in antenna for a radio communication device that operates at plural frequency bands and has improved antenna performances.

The solution is achieved by the additional technical features (a)-(d). This is not suggested by the available prior art D1. Consequently, the solution proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT).

Claims 2-11 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A multiband radio antenna device (1) for a radio communication terminal, comprising a flat ground substrate (2), and in a plane parallel to said ground substrate a flat parasitic element (7) having a ground connection (9), and a flat antenna element (3) having a feeding point (8) and a ground connection (10,11), wherein said antenna element has a first longitudinal member (4), a first transverse member (5) extending from a first end portion of said first longitudinal member, and a second transverse member (6) extending from said first longitudinal member in the same direction as said first transverse member, wherein said parasitic element extends parallel to said second transverse member, **characterised in** that said second transverse member (6) extends from a centre portion of said first longitudinal member, said parasitic element (7) extends between said first and second transverse members, along and adjacent to an outer portion of said second transverse member (6) from a centre portion of the second transverse member (6), wherein said feeding point (8) is disposed at said centre portion of the second transverse member (6), a first ground connection (10) of the antenna element is disposed at an end portion, opposite said longitudinal member, of the second transverse member (6), and a second ground connection (11) of the antenna element is disposed at a centre portion of said first transverse member (5).

2. The multiband radio antenna device as recited in claim 1, **characterised in** that said parasitic element has a first ground connection (9) disposed adjacent to said feeding point.

3. The multiband radio antenna device as recited in claim 1, **characterised in** that said antenna element has a second longitudinal member (12) extending from said end portion of said second transverse member, away from said first transverse member.

4. The multiband radio antenna device as recited in claim 3, **characterised in** that said antenna element has a third transverse member (13) extending from an end portion of said second longitudinal member opposite said second transverse member, towards said first longitudinal member.

5. The multiband radio antenna device as recited in claim 4, **characterised in** that said antenna element has a fourth transverse member (14) extending from said first longitudinal member between said second and said third transverse members.

6. The multiband radio antenna device as recited in claim 1, **characterised in** that said feeding point is disposed on a protruding member (15) at said centre portion of the second transverse member, protruding towards first transverse member.

7. The multiband radio antenna device as recited in claim 6, **characterised in** that said protruding member is tapered towards said first transverse member.

8. The multiband radio antenna device as recited in claim 7, **characterised in** that said parasitic element has a leg member (16) extending parallel to a side of the tapered protruding member facing away from said first longitudinal member.

9. The multiband radio antenna device as recited in any of the previous claims, **characterised in** that a an outer portion, extending from said centre portion, of said first transverse member has a side edge facing said second transverse member, which side edge extends at an angle towards said second transverse member, such that said first transverse member widens towards its outer end.

10. The multiband radio antenna device as recited in any of the previous claims, **characterised in** that said ground plane has a longitudinal length of one third of a selected base band.

11. A radio communication terminal (30) comprising a multiband radio antenna device according to any of the previous claims.